National Aeronautics and Space Administration

FY 2021
Energy and Water Performance Plan

Approval and Concurrence

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EXECUTIVE SUMMARY

PURPOSE OF THIS PLAN

This Energy and Water Performance Plan (EWPP)[1] outlines NASA's strategy and management approach to **ensure the agency successfully accomplishes its mission while using the minimum amount of energy and water required and meeting Federal energy and water goals**.

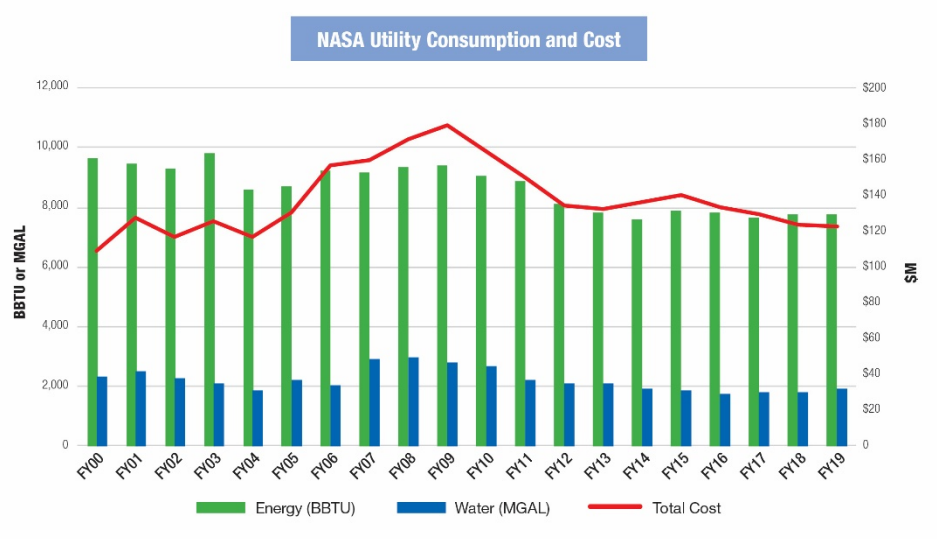
The strategic approach outlined in this plan also improves the sustainability and resilience of NASA's operations by reducing greenhouse gas emissions, extending equipment life, improving the operating condition of facilities, and installing clean energy generation to the maximum extent practicable.

The strategic approach presented here assumes unconstrained resources. Implementation of the 26 initiatives outlined in the EWPP will proceed according to available staff and budget resources.

IMPACT OF ENERGY AND WATER ON NASA'S BUDGET

Energy and water resources are essential to the success of all of NASA's missions – resources that come at significant cost to the agency. **Utilities comprise around 20-25% of the agency's facilities services expenditure, at an average cost of $126M from FY17-FY19 and over 0.5% of the total NASA budget in FY19**.[2] In an era of increasingly constrained operational budgets, NASA must aggressively pursue any and all means to use energy and water efficiently and reduce these costs while still fulfilling its mission.

While many factors affect NASA's utility bills, including mission variability and market prices, NASA's energy and water stewardship has significantly reduced the agency's utility cost and consumption. Due in part to this stewardship, **in FY19 the agency would have spent $29.5M more in energy utility costs had consumption remained at FY00 levels.**



[1] NPR 8570.1B, NASA Energy and Water Management Program, requires the EWPP to document NASA's strategy to meet energy water management goals and objectives and the approach for meeting NPR program requirements.

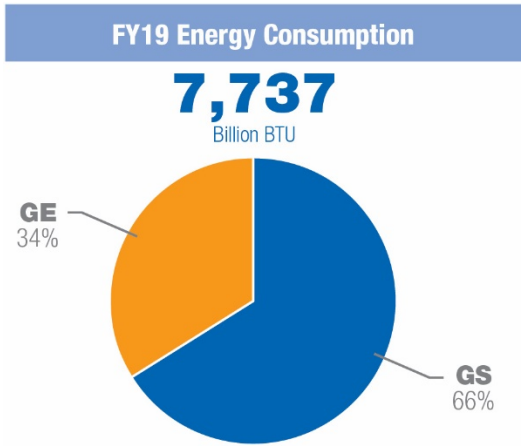
[2] The FY21 NASA EWPP does not include FY20 data due to the significant anomalies in energy/water consumption and energy cost caused by impact of the COVID-19 pandemic on agency activities.

NASA PROGRESS IN FEDERAL ENERGY/WATER GOALS

NASA has also been **successful in meeting Federal energy/water (E/W) goals** (see FY20 progress on goals); until FY19, the primary goal of the agency energy and water management (EWM) program was to meet Federal goals.

However, because many aspects of NASA's essential operations are heavily energy-intensive with energy use driven by mission requirements, the agency excludes these operations from the goal requirements (as allowed by Federal statute).[3]

As a result of these exclusions, in the past NASA made minimal investment in energy and/or water conservation measures (ECMs)[4] in these facilities (also known as "goal excluded" or "GE" facilities), which consume 30-40% of the agency's energy.



GE: Energy consumed in a "Goal Excluded" facility (excluded from Federal goals)
GS: Energy consumed in a "Goal Subject" facility (subject to Federal goals)

LOOKING FORWARD: GAINING EFFICIENCY AND REDUCING COST

NASA has begun to fund projects in facilities that are significant energy and water uses (SEUs) and represent new potential for utility cost reductions. Many of these facilities, such as launch facilities, wind tunnels, and high-pressure compressor stations, are GE and have not yet received any energy/water efficiency investments.

Additional energy and water management efficiencies are possible across all of NASA's operations through initiatives such as leveraging facilities operations capabilities, optimizing the EWM workforce, improving utility procurement management, and standardizing best management practices across the agency**. This plan outlines a comprehensive strategy for realizing these efficiencies, but the timeframe for implementing these efficiencies will depend on the availability of staff and budget resources.**

[3] For the most current list of NASA's goal excluded facilities, see tab "4.7 Excluded Building List" in the NASA 2020 Energy and Water Workbook of Record.

[4] For the purpose of this document, the acronym "ECM" denotes both energy and water conservation, including on-site clean energy projects that conserve grid- or utility-supplied energy/water.

These opportunities are addressed in **three strategic goals** outlined in this EWPP:

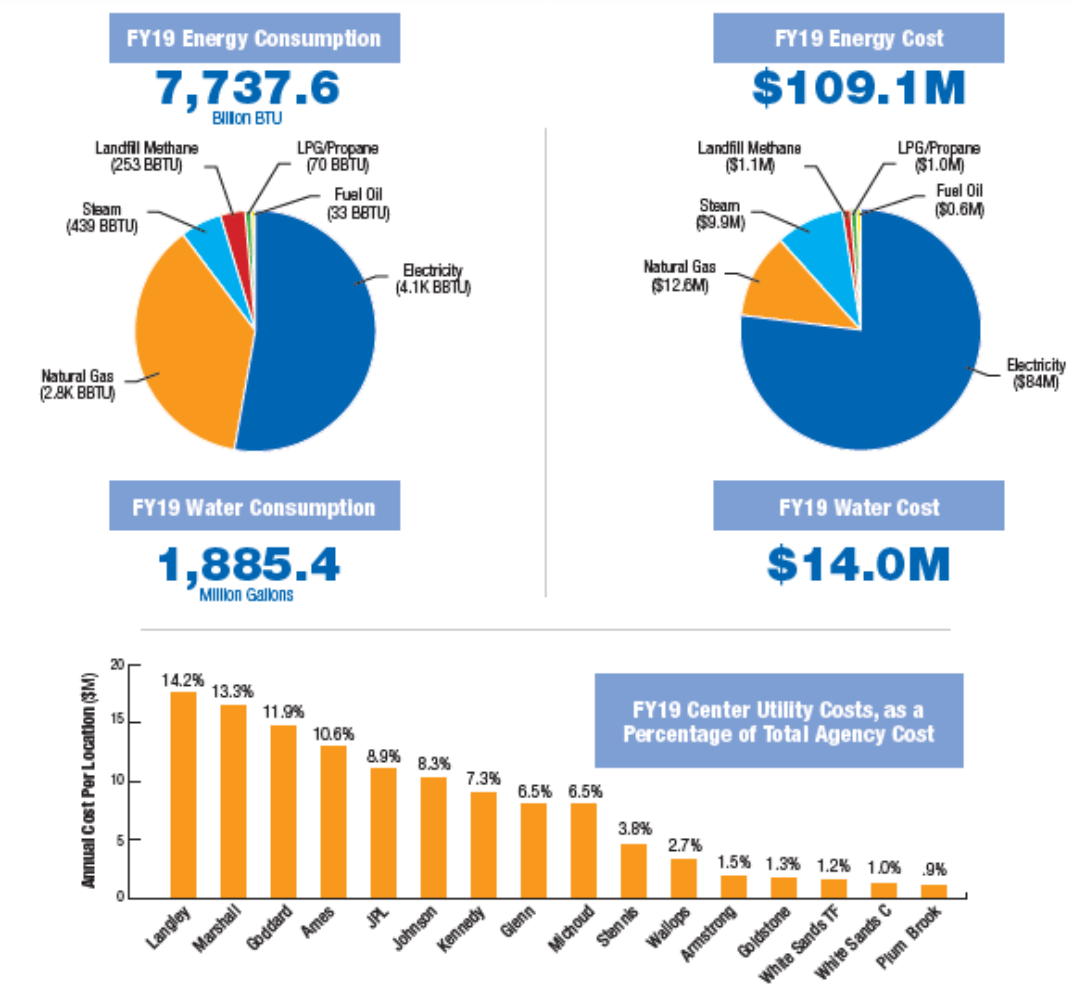
Implement a strategic enterprise management approach to NASA's EWM program to ensure program quality, continuity, and continual improvement.

Manage supply cost, optimize life cycle cost in project investments, and operate and maintain facilities efficiently.

Promote sustainable practices and foster a proactive, sustainability-focused culture agencywide to minimize the agency's impact on the environment.

SNAPSHOT OF NASA ENERGY AND WATER COST AND CONSUMPTION

The below graphic gives an overview of NASA's energy and water consumption by type as well as total utility cost by center. For more details, see the full FY19 NASA energy and water fact sheet and infographic.



HOW TO USE THE EWPP

This EWPP has two components:

Energy and Water Strategic Plan

- Documents NASA's energy and water goals and objectives
- Details specific initiatives to achieve these goals and objectives

Highlights

Goal 1: Strategic Program Management
Implement a strategic enterprise management approach to ensure program quality, continuity, and continual improvement.

Goal 2: Affordability
Manage supply cost, optimize life cycle cost in project investments, and operate and maintain facilities efficiently.

Goal 3: Sustainability
Promote sustainable practices and foster a proactive, sustainability-focused culture agencywide to minimize NASA's impact on the environment.

Energy and Water Management Plan

- Documents NASA's EWM framework
- Ensures continual improvement and compliance with Federal and agency requirements

Highlights

NASA Energy and Water Management Policy
The foundation of NASA's EWM program is NASA Policy Directive (NPD) 8500.1C, NASA Environmental Management.

NASA Procedural Requirement (NPR) 8570.1B, NASA Energy and Water Management Program, states the requirements for agency and center EWM programs to fulfill NPD 8500.1C.

HQ Energy Management System
The Management Plan details how agency and center EWM programs meet NPR 8570.1B requirements and Federal requirements.

The EWPP is applicable to all NASA centers and associated Component Facilities ("centers") and is updated annually to reflect progress/adjustments in the Strategic Plan as well as any changes in management practices. These annual updates will be presented to the Office of Strategic Infrastructure (OSI) Assistant Administrator (AA) for review and approval but will not require OSI AA signature.

Every 5 years, concurrent with the NPR 8570.1 update cycle, the OSI Energy/Water Team ("OSI E/W Team") will facilitate a full update to the EWPP requiring OSI AA signature.[5]

[5] See the Energy and Water Management Plan for membership of OSI E/W Team and EWPP update process.

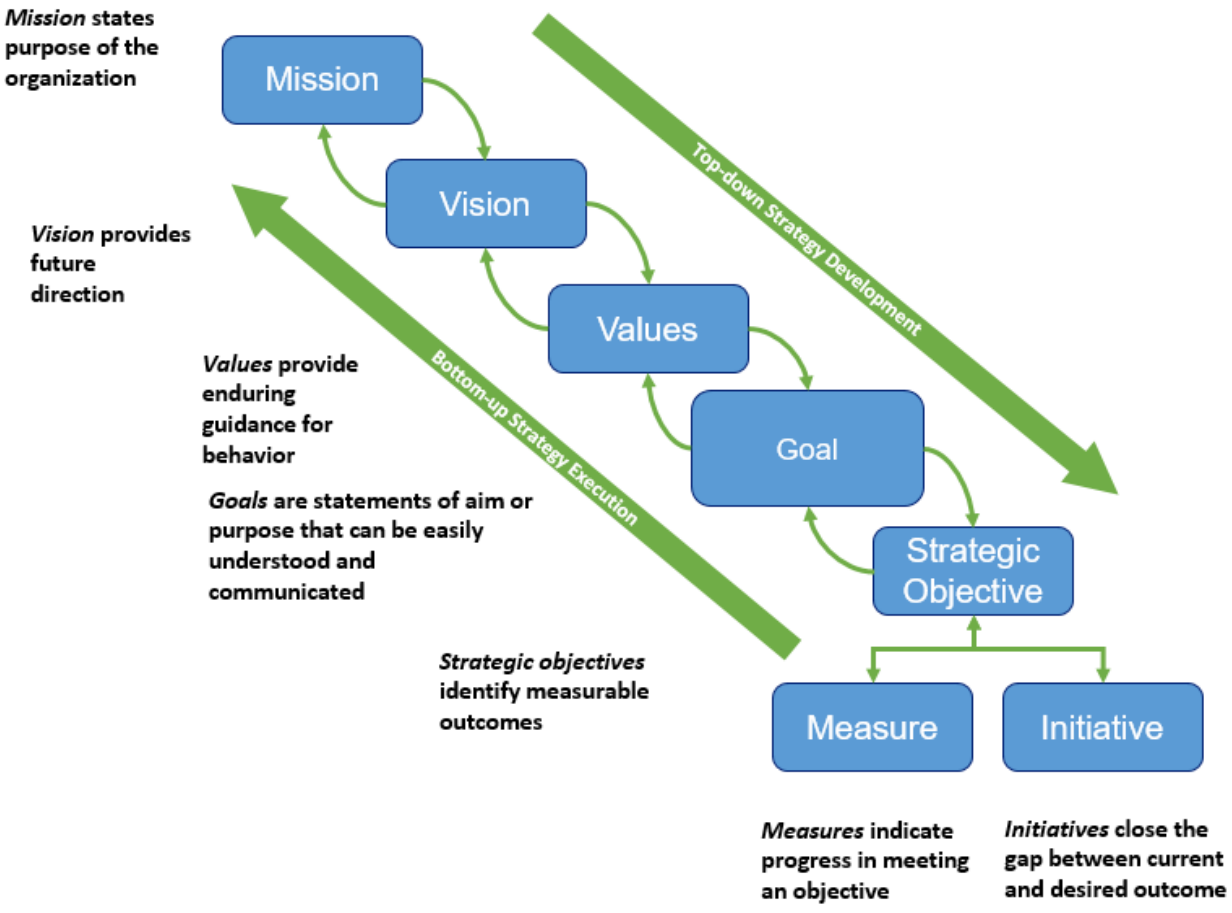
ENERGY AND WATER STRATEGIC PLAN

OVERVIEW

This FY21 NASA Energy and Water Strategic Plan (SP) is NASA's first plan to comprehensively address E/W management across the agency. The SP was developed under the leadership of the OSI E/W Team and in collaboration with the E/W community and other stakeholders across NASA.[6]

The plan outlines 26 initiatives to improve EWM programs across the agency, reduce utility cost and consumption, and increase NASA's sustainability.

The planning process was iterative and followed the classic strategic framework shown below.



This SP includes each of these elements – mission, vision, values, goals, strategic objectives, measures of success, and initiatives – from the agencywide perspective.

[6] For a more detailed description of the strategic planning process, see the Energy and Water Management Plan.

MISSION, VISION, AND CORE VALUES

The following are the mission, vision, and core values of the NASA Energy and Water Management Program:

Mission: The NASA EWMP's mission is to enable NASA's mission by sustaining infrastructure capabilities and operations (NASA Strategic Plan Strategic Objective 4.6).

Vision: A NASA that successfully accomplishes its mission using the minimum amount of energy and water required.

Core Values: These are the values the NASA energy and water community strives to embody in our work:

- **Strategic –** We ensure EWM aligns with mission by integrating energy/water and facilities planning at the agency and center level.
- **Smart –** We leverage the right data at the right time to make informed decisions.
- **Innovative –** We use the right tools to achieve the best outcome.
- **Inclusive –** We engage all of NASA's workforce in efficiently using energy and water resources in their work.
- **Collaborative –** We include all relevant stakeholders and work together to achieve NASA's EWM vision.
- **Accountable –** We are transparent in our planning and execution and responsible for results.
- **Always Improving –** We continually strive to better achieve our EWM goals.

STRATEGIC GOALS, OBJECTIVES, AND INITIATIVES

The NASA EWM program has established three **goals** for realizing this vision:

Implement a strategic enterprise management approach to NASA's EWM program to ensure program quality, continuity, and continual improvement.

Manage supply cost, optimize life cycle cost in project investments, and operate and maintain facilities efficiently.

Promote sustainable practices and foster a proactive, sustainability-focused culture agencywide to minimize the agency's impact on the environment.

These three EWMP goals flow directly from the four OSI Mission Support Future Architecture Program (MAP) strategic thrusts and the four OSI Environmental Management Enterprise (EME) goals.[7]

Each goal has **objectives** with strategies to accomplish that goal and performance measures to provide metrics for assessing progress and enabling continual improvement.

[7] As of May 2021, the EME goals have not been finalized. The EWPP will be updated once the goals are finalized.

Goal	Objective
1. Strategic Program Management	1.1 Implement energy/water program management best practices across the agency, including standardization and centralization where warranted.
	1.2 Develop and implement E/W workforce staffing strategy to meet the mission needs of 2025 and beyond.
2. Affordability	2.1 Optimize procurement and utility cost and standardize policies for consistency across the agency.
	2.2 Collect, manage, integrate, and analyze data to improve operational efficiency and to measure and verify results.
	2.3 Effectively identify, evaluate, and implement energy/water efficiency projects/initiatives to minimize life cycle costs and maximize utility cost/consumption reductions.
	2.4 Leverage facilities operations capabilities to maximize utility cost/consumption savings.
3. Sustainability	3.1 Ensure NASA continues progress toward clean energy and sustainable facilities goals in its annual Sustainability Plan.
	3.2 Foster a proactive, energy/water conservation-focused culture agencywide.

Each objective has one or more **initiatives** – tactical approaches that provide clear steps to achieving the strategic goals. Each current and near-term initiative is required to have a Plan of Action and Milestones (POAM). These POAMs are developed by the person(s) responsible for the initiative in consultation with other stakeholders.[8]

The SP has a total of 26 initiatives, with the majority (16 of 26) focused directly on affordability.

A note on infrastructure resilience and this plan: OSI is developing an agencywide resilience plan which will address critical resilience topics such as energy and water resource availability; therefore, this SP does not

[8] These POAMs are not included in the EWPP but are maintained here on the EWMP SharePoint site. Note that only near-term initiatives have a POAM.

directly address resilience. Nevertheless, the SP contains many initiatives that enhance resilience at NASA facilities

HOW TO READ THIS STRATEGIC PLAN

Each initiative detailed description includes the following elements:

- **Rationale:** Brief summary of why the initiative is important to reaching the SP goals/objectives
- **Measures of Success**: What metrics or evidence will be used to assess progress/measure effectiveness of the initiative
- **Getting it Done**: High-level summary of steps to accomplishing the initiatives
- **Stakeholders:** List of stakeholders and their role in the initiatives, using the Responsible/Accountable/Consult/Inform (RACI) model (see next page) – note that some of these initiatives will likely be led by a detailee or center-based civil servant, but this has not yet been determined
- **Additional Resources Required:** Rough estimate of required staff and budget resources that are in addition to current civil service, contract, and funding resources (initiatives that need additional information to determine resources have "TBD" in this element)
- **Implementation Timeframe:** FY targeted for beginning implementation – estimated FY for completion if required staff and budget resources are available
- **Anticipated Benefits:** Lists which of the following five OSI/EME goals the initiative supports:
    - Improved Efficiency and Effectiveness
    - Standardized Solutions and Services
    - Cost Savings (as part of Reducing Risk)
    - Workforce Development
    - Promotes Sustainable Practices

Each goal, objective, and initiative in this plan moves NASA toward that optimal operational state where mission infrastructure is fully available, reliable, and resilient, as well as energy- and water-efficient as possible.

RACI Model for Stakeholders[9]

RACI Definitions	
Responsible	People or stakeholders who do the work. They must complete the task or objective or make the decision. Several people can be jointly *Responsible*.
Accountable	Person or stakeholder who is the "owner" of the work. He or she must sign off or approve when the task, objective or decision is complete. This person must make sure that responsibilities are assigned in the matrix for all related activities. Success requires that there is only one person *Accountable*, which means that "the buck stops there."
Consult	People or stakeholders who need to give input before the work can be done and signed-off on. These people are "in the loop" and active participants.
Inform	People or stakeholders who need to be kept "in the picture." They need updates on progress or decisions, but they do not need to be formally consulted, nor do they contribute directly to the task or decision.

[9] Definitions from https://www.cio.com/article/2395825/project-management-how-to-design-a-successful-raci-project-plan.html.

GOAL 1: STRATEGIC PROGRAM MANAGEMENT

Implement a strategic enterprise management approach to NASA's EWM program to ensure program quality, continuity, and continual improvement.

OBJECTIVE 1.1 ENERGY/WATER MANAGEMENT BEST PRACTICES

Implement EWM best practices across the agency, including standardization and centralization where warranted.

Initiative 1.1.1 50001 Ready Implementation

Standardize center/HQ E/W management systems (EnMS) to facilitate program consistency, quality, and continual improvement.

Initiative 1.1.1 50001 Ready Implementation

Establish a HQ E/W Efficiency Team comprised of key HQ functional leads to create integrated, cross-functional and cross-organizational HQ leadership of the agency EWM Program.

Initiative 1.1.3 Integrate Energy/Water and Master Planning

Integrate E/W strategic planning into the Agency Master Plan (AMP) to ensure alignment with agency priorities.

Initiative 1.1.4 Center Energy/Water Goals

Align center EWM program goals with agencywide goal of cost/consumption reduction in SEUs to encourage centers to implement E/W projects with the highest cost/consumption impacts.

OBJECTIVE 1.2 ENERGY/WATER WORKFORCE STAFFING STRATEGY

Develop and implement E/W workforce staffing strategy to meet the mission needs of 2025 and beyond.

Initiative 1.2.1 Energy/Water Workforce Optimization

Align E/W civil service and contract support workforce with agency priorities.

Initiative 1.2.2 Energy/Water Management Training

Standardize training programs for personnel in key EWM functions to facilitate consistency, technical competence, and professionalism in NASA E/W management.

INITIATIVE 1.1.1 50001 READY IMPLEMENTATION

Standardize EWM systems across the agency to facilitate program consistency, quality, and continual improvement.

Rationale

While NPR 8570.1 establishes the requirements, roles, and responsibilities for agency and center EWM programs, it does not specify how to execute these programs. As a result, centers vary in program implementation effectiveness, and some best management practices such as continual improvement processes are largely missing.

In addition, center EWM programs are in the midst of a significant paradigm shift, as OSI has begun targeting reductions in all E/W cost and consumption, not just "goal subject" consumption that is subject to Federal goals, and on measuring and verifying results of investments and initiatives.

The Department of Energy's (DOE) 50001 Ready Program, a no-cost framework aligned with ISO 50001, will guide the agency in addressing significant gaps in its EWM program that will result in real avoided utility cost/consumption. Other benefits include better program resilience in the face of frequent personnel changes and streamlined program functional review processes. NASA will implement the DOE 50001 framework inclusive of all associated tasks and program elements at all centers to establish program consistency and continual improvement.

Measures of Success

- HQ/centers follow E/W action plans that include SEU cost/consumption investments/initiatives.
- HQ/center E/W action plans are updated annually and demonstrate continual improvement.

Getting it Done

- ✓ Train E/W community of practice in 50001 Ready implementation.
- ✓ Centers/HQ complete initial EWM program assessment using 50001 Ready.
- ✓ Environmental Management Division (EMD) reviews center assessments and provides feedback.
- ✓ EMD uses 50001 Ready EnMS as basis of triennial functional reviews of center programs.
- ✓ HQ program is reviewed annually as part of HQ EMS review.
- ✓ Center action plans inform agency planning.

Stakeholders

Responsible: EMD Energy Manager

Accountable: EMD Management

Consult: Facilities and Real Estate Division (FRED) Energy Manager, OSI Critical Infrastructure Engineer (CIE), Energy/Water Efficiency Panel (EEP)

Inform: FRED Management, OSI AA

Additional Resources Required:

No-cost DOE 50001 Ready support

Implementation Timeframe:

FY20-FY24

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓		

INITIATIVE 1.1.2 HQ ENERGY/WATER EFFICIENCY TEAM

Establish a HQ E/W Efficiency Team comprised of key HQ functional leads to create integrated, cross-functional, and cross-organizational HQ leadership of the agency EWM Program.

Rationale

In developing the E/W Strategic Plan key initiatives, the OSI E/W Team has recognized the necessity of close partnerships with other HQ functional leads in order to successfully implement the plan. To facilitate these partnerships, the OSI E/W Team will establish a HQ Energy/Water Efficiency Team (EET), which will include mission programs; information/operational technology; resources management; facilities master planning, design and construction, and operations and maintenance; environmental; legal; and procurement representatives.

The HQ EET will support development of agency-level E/W policy, planning, and leadership strategy; implement NASA E/W policies appropriate to their functional areas; recommend E/W efficiency initiatives; and develop consensus positions on E/W efficiency and conservation priorities, practices, and issues across agency activities.

Measures of Success

- HQ EET members are engaged and take leadership of E/W initiatives appropriate to their functional role.

Getting it Done

- ✓ Recruit appropriate members and obtain supervisory approval.
- ✓ Develop formal team description, including purpose, functions, membership, and meeting schedule.
- ✓ Begin regular meetings/engagement to accomplish EET objectives.

Stakeholders

Responsible: EMD/FRED Energy Managers

Accountable: EMD/FRED Management

Consult: EET members: Mission directorate(s), OSI CIE, Office of the Chief Financial Officer (OCFO), FRED, EMD, Office of the General Council (OGC), Office of Procurement (OP), OCIO

Inform: EET members' management, EEP, OSI AA

Additional Resources Required:

EET member time commitment

Implementation Timeframe:

FY21

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓				✓

INITIATIVE 1.1.3 INTEGRATE ENERGY/WATER AND MASTER PLANNING

Integrate E/W strategic planning into the Agency Master Plan to ensure alignment with agency priorities.

Rationale

The NASA AMP is mission-driven and focused on facility and infrastructure affordability, so E/W costs and consumption are key elements for the plan. These elements are currently integrated in the AMP's Goal 3 "Affordable Portfolio" and Goal 5 "Sustainable Practices."

In order to ensure the EWM program, particularly E/W investments and initiatives, is aligned with NASA's mission and long-term facility management plan, the OSI E/W Team will communicate and collaborate with the agency master planning team to integrate EWM planning into agency master planning policy and guidance.

The OSI E/W Team will also collaborate with the FRED Master Planner to develop training and/or guidance for centers on how to integrate E/W planning into center master planning.

Measures of Success

- E/W investments/initiatives are focused on highest priority infrastructure/facilities across agency
- No E/W investments/initiatives implemented in facilities slated for demolition/excess or low Facilities Condition Index ≤ 3.5 and low Mission Dependency Index ≤ 50

Stakeholders

Responsible: EMD Energy Manager / FRED Master Planner

Accountable: EMD/FRED Management

Consult: FRED Energy Manager, OSI CIE

Inform: EEP, center Master Planners, OSI AA

Additional Resources Required: None

Implementation Timeframe: FY20-FY22

Getting it Done

- ✓ OSI E/W Team participates in AMP development.
- ✓ EMD and FRED collaborate to develop center training on integrating E/W planning and master planning.
- ✓ OSI E/W Team participates in future AMP updates.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓				✓

INITIATIVE 1.1.4 CENTER ENERGY/WATER GOALS

Align center EWM program goals with agencywide goal of cost/consumption reduction in SEUs to encourage centers to implement E/W projects with the highest cost/consumption impacts.

Rationale

Historically NASA has "pushed down" Federal E/W goals to centers, requiring each to individually meet all Federal goals. For example, OSI has pushed the Federal energy use intensity (EUI) reduction requirement down to centers. As a result, centers have invested primarily in ECMs in facilities that are subject to external Federal energy reduction requirements.

While the agency has realized real cost avoidance using this approach, approximately 30-40% of its total energy has been mostly excluded from energy efficiency investments. In addition, many centers are meeting the EUI reduction goal through renewable/thermal energy credits that do not translate to actual cost savings.

In order to set E/W goals that drive investments with the highest ROI, centers will assess SEUs at their sites and establish annual goals for reducing E/W consumption based on these assessments. EMD will use these annual internal goals to inform overall internal annual agency goals and metrics. During triennial Environmental and Energy/Water Functional Reviews (EEFRs), centers will be assessed on how they are progressing in their internal goals rather than in externally mandated Federal goals.

Measures of Success

- Centers have set measurable E/W use reduction goals and are showing progress in meeting those goals.

Getting it Done

- ✓ Centers identify SEUs; determine baselines and relevant variables affecting the SEUs; and set reduction goals based on their assessment of opportunities for improvement.
- ✓ Centers may also set non-SEU related goals that will improve their EWM programs and lead to reduced utility cost/consumption.
- ✓ EMD reviews and approves the center goals.
- ✓ EMD uses the center-determined E/W goals in review of center programs as well as in benchmarking agencywide progress in reducing E/W cost/consumption.

Stakeholders

Responsible: EMD Energy Manager / Center Energy Managers

Accountable: EMD Management / Center Operations Management

Consult: FRED Energy Manager, FRED Management, OSI CIE

Inform: OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY22-FY25

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓		✓		

INITIATIVE 1.2.1 ENERGY/WATER WORKFORCE OPTIMIZATION

Align E/W civil service and contract support workforce with agency priorities.

Rationale

Across the agency, EWM programs are staffed at varying levels that do not always correlate to the complexity/size of a center's utility consumption/spend. Under-staffing at centers with large utility spends/complex utility use can lead to poorer program performance. In order to ensure center programs are effectively managed to minimize utility costs, EMD will assess staffing across the agency; establish guidance for staffing levels; standardize E/W manager position descriptions; and identify training needs. EMD will also assess the viability of agencywide or regionalization of some roles (such as performance contract management) and make efficiency recommendations to OSI based on the assessment results.

EMD will also assess contract support roles/contracting mechanisms to identify potential efficiencies. Currently support staffing is managed separately by each center, resulting in duplicative contracting actions (sometimes multiple contract actions per center), duplication of roles/expertise, and uneven staffing levels. HQ will assess the viability of an agencywide EWM support contract with regionalization for some roles (such as data management and facility audit support) and make efficiency recommendations to OSI based on the assessment.

Measures of Success

- HQ/centers staffed according to utility consumption/spend and complexity of operations.
- Centers able to provide cross-agency EWM program support.
- Centers perform well on EEFRs.
- Number and/or cost of E/W support contracts decreases.

Getting it Done

- ✓ Document existing staffing levels.
- ✓ Establish guidance for staffing levels based on center utility cost/ consumption and complexity of operations.
- ✓ Assess viability of centralizing/ regionalizing some roles.
- ✓ Standardize civil service center E/W manager position descriptions.
- ✓ Assess contract support roles/contracting mechanisms to identify potential efficiencies.
- ✓ Apply practicable civil service/ contract support efficiencies.

Stakeholders

Responsible: EMD Management / Center Operations Management

Accountable: OSI AA

Consult: EMD/FRED Energy Managers, OSI CIE, Center Energy Managers, OP

Inform: FRED Management

Additional Resources Required: TBD

Implementation Timeframe: FY20-TBD

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓		✓	

INITIATIVE 1.2.2 ENERGY/WATER MANAGEMENT TRAINING

Standardize training programs for personnel in key EWM functions to facilitate consistency, technical competence, and professionalism in NASA E/W management.

Rationale

Effective E/W cost/consumption reduction depends on the engagement and support of many different disciplines, including E/W managers, facilities managers, operations and maintenance personnel, and project managers. Federal statutes require that these personnel receive training in E/W management, and GSA has developed tools to assess knowledge gaps and identify free/low-cost training tools to address these knowledge gaps. However, NASA has not issued any guidance or requirements for training.

In order to ensure key personnel are trained in effective E/W management methods within their functional roles, EMD will lead development of standardized training programs in these areas and facilitate roll-out of the programs across the agency.

Measures of Success

- 50% of center personnel identified by OSI as high priority for meeting the requirements of the Federal Buildings Personnel Training Act (FBPTA) of 2010 have evaluated their compliance with the FBPTA and have begun an agency-approved training program to address any compliance gaps by the end of FY23.

Stakeholders

Responsible: EMD Energy Manager

Accountable: EMD Management

Consult: FRED Energy Manager, FRED Operations and Maintenance (O&M) Managers, OSI CIE, Centers, GSA

Inform: FRED Management, OSI AA

Additional Resources

Required: ~$150K for defining and deploying training program based on existing tools for targeted center roles (such as E/W Managers, O&M Managers, etc.) (based on GSA estimate)

Implementation Timeframe

Timeframe: FY22-FY24

Getting it Done

- ✓ Define training requirements and assess options for deploying training.
- ✓ Develop training deployment plan.
- ✓ Implement training.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓		✓	✓

GOAL 2: AFFORDABILITY

Manage supply cost, optimize life cycle cost in project investments, and operate and maintain facilities efficiently.

OBJECTIVE 2.1 UTILITY COST AND PROCUREMENT

Optimize procurement and utility cost and standardize policies for consistency across the agency.

Initiative 2.1.1 Utility Procurement Acquisition Strategy

Assess opportunities to optimize procurement and utility cost to lower utility cost and make utility procurement and contract administration more efficient across the agency.

Initiative 2.1.2 Utility Rebate Retention

Establish agencywide legal guidance on utility rebate/incentive retention authority to ensure centers are retaining the maximum amount of funds possible.

Initiative 2.1.3 Utility Cost Avoidance Reinvestment

Establish agencywide guidance on retention and use of utility cost avoidance to promote re-investment of savings into ECMs that will lower agency operating and maintenance costs.

OBJECTIVE 2.2 DATA INTEGRATION, MANAGEMENT, AND ANALYTICS

Collect, manage, integrate, and analyze data to operate efficiently and to measure and verify results.

Initiative 2.2.1 Data Integration, Management, and Analytics Plan

Develop and implement a data integration, management and analytics plan to provide the critical information and analytics needed to effectively identify, prioritize, and evaluate the effectiveness of E/W projects and initiatives.

Initiative 2.2.2 Agency Metering Plan

Develop and implement E/W metering plan that prioritizes metering investments according to impact on E/W cost management.

OBJECTIVE 2.3 ENERGY/WATER PROJECT MANAGEMENT

Effectively identify, evaluate, and implement E/W efficiency projects/initiatives to minimize life cycle costs and maximize utility cost/consumption reductions.

Initiative 2.3.1 Energy Performance Contract Management

Develop and implement centralized agency project proposal review, approval, implementation, and post-construction management protocols and expertise to better manage future agency utility budget obligations (and associated risks) of financed E/W projects.

Initiative 2.3.2 ECM Prioritization and Implementation Processes

Implement an agencywide ECM project prioritization and implementation process that is flexible, responding to changing mission priorities and fluctuating fund availability, and maximizes the agency's ROI.

Initiative 2.3.3 Agency Energy Modeling Strategy

In order to maximize agency E/W investment ROI, identify preferred energy modeling software for agency ECM identification and measurement and verification, develop or procure expertise in using these models, and ensure consistent applications of the models across projects.

Initiative 2.3.4 Agency ECM Database

Standardize methodologies to identify ECMs to improve project data consistency and quality, identify SEU projects/initiatives, and provide a single database to facilitate efficient project prioritization for implementation.

Initiative 2.3.5 ECM Measurement and Verification

In order to maximize agency E/W investment ROI, develop and implement guidance on when and how to perform measurement and M&V on ECMs.

OBJECTIVE 2.4 ENERGY/WATER IN O&M

Leverage facilities operations capabilities to maximize utility cost/consumption savings.

Initiative 2.4.1 Energy/Water in O&M Contracts

Partner with Procurement to develop standard contract language for procuring O&M services specific to supporting E/W management.

Initiative 2.4.2 SEU Process Improvements

Optimize SEU operations processes where possible to reduce E/W cost/consumption.

Initiative 2.4.3 EMCS/BAS Operational Guidance

Standardize energy management control system (EMCS) / building automation system (BAS) E/W management best practices consistently across agency to optimize E/W efficiency.

Initiative 2.4.4 EMCS/BAS Analytics

Implement EMCS/BAS analytics to further reduce E/W cost/consumption.

Initiative 2.4.5 Continuous Commissioning

Expand continuous commissioning to reduce E/W cost/consumption.

Initiative 2.4.6 O&M Functional Reviews

Based on NPR 8831.2, Facilities Maintenance and Operations Management, develop and implement an agencywide functional review program to provide oversight of and support to center O&M programs.

INITIATIVE 2.1.1 UTILITY PROCUREMENT ACQUISITION STRATEGY

Assess opportunities to optimize procurement and utility cost to lower utility cost and make utility procurement and contract administration more efficient across the agency.

Rationale

Creating an agencywide utility database and assessing optimization opportunities is a low-cost initiative with significant potential for lowering utility costs. In addition, OSI currently does not have a comprehensive agencywide view or oversight of over $120M in utilities procurement contracts, which puts NASA at financial audit risk.

In order to ensure NASA is procuring utilities at optimal cost/contract terms, FRED/OP will assess opportunities to optimize cost/level of effort of procurement and plan implementation of any identified optimization opportunities, including purchase of electricity from renewable sources. FRED/OP will also evaluate options for simplifying/standardizing the procurement and administration of utility contracts.

Measures of Success

- NASA utility costs are optimized for lowest cost while still supporting the mission.
- All centers are maximizing utility rebates.

Stakeholders

Responsible: FRED Utility Manager / OP Utility Procurement Lead

Accountable: FRED/OP Management

Consult: EMD/FRED Energy Managers, OSI CIE, Centers (OP, O&M, E/W Managers)

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY21-FY22

Getting it Done

- ✓ Collect key data on all utility/commodity contracts in the agency and consolidate into one database.
- ✓ Identify optimization opportunities for agency utility/commodity procurements.
- ✓ Develop utility/commodity optimization plan and begin implementation.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓		✓

INITIATIVE 2.1.2 UTILITY REBATE RETENTION

Establish agencywide legal guidance on utility rebate/incentive retention authority to ensure centers are retaining the maximum amount of funds possible.

Rationale

Currently some centers are retaining only 50% of utility rebates/other savings from ECMs while others are retaining 100%. This discrepancy is caused by conflicting statutory language on agency authority to retain utility rebates or other utility savings from ECMs. Each center's legal counsel currently establishes center-level guidance, but this guidance is not consistent across the agency. The OSI E/W Team believes the Congressional intent in existing statute is to allow 100% retention.

Establishing an agency policy will eliminate confusion and create consistency across all centers, and if OGC determines 100% retention policy is statutory, the agency will retain the additional funds for energy investments.

Measures of Success

- All centers follow agencywide guidance and are consistent in their treatment of utility rebates or other utility savings from energy/water conservation measures.

Stakeholders

Responsible: FRED Utility Manager / OGC Energy/Water Liaison

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, OCFO, other OGC representatives

Inform: EMD/FRED/OP/OGC/OCFO Management, OSI AA

Additional Resources Required: None

Implementation Timeframe: FY21-FY22

Getting it Done

- ✓ Review applicable statutes and relevant resources on NASA retention of utility rebates/savings.
- ✓ Develop and issue agencywide guidance on NASA retention of utility rebates/savings.
- ✓ Train center personnel on agency guidance.
- ✓ Implement consistent treatment at all centers.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
	✓			

INITIATIVE 2.1.3 UTILITY COST AVOIDANCE REINVESTMENT

Establish agencywide guidance on retention and use of utility cost avoidance to promote re-investment of savings into ECMs that will lower NASA operating and maintenance costs.

Rationale

NECPA (42 USC 8256 (e) Retention of Energy and Water Savings allows NASA to re-invest utility cost savings from implemented energy and water conservation measures in additional ECMs. However, center EWM programs have long struggled to retain these savings, thanks to persistent pressure on O&M budgets and challenges in measuring and verifying savings. Establishing agencywide guidance will lay the groundwork for retaining the savings and allowing centers access to more funding for ECMs.

Measures of Success

- All centers are reinvesting avoided utility costs in additional ECMs.

Stakeholders

Responsible: FRED Utility Manager

Accountable: FRED Management / Center Operations Management

Consult: EMD Energy Manager, OP, Centers (EM, O&M)

Inform: EMD Management, OSI AA

Additional Resources Required: None

Implementation Timeframe: FY24-FY26

Getting it Done

- ✓ Establish consistent ECM M&V practices at the centers (Initiative 2.3.5).
- ✓ Centers use the M&V results to quantify avoided utility costs due to implemented ECMs.
- ✓ Centers retain and reinvest these avoided costs in additional ECMs.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓		

INITIATIVE 2.2.1 DATA INTEGRATION, MANAGEMENT, AND ANALYTICS PLAN

Develop and implement a data integration, management, and analytics plan to provide the critical information and analytics needed to effectively identify, prioritize, and evaluate the effectiveness of E/W projects and initiatives.

Rationale

NASA's many facility databases are siloed, making it very difficult to do portfolio analyses for E/W investment decisions as well as understand full impacts of E/W project/initiative investments. Integrating data critical to these decisions will decrease NASA's E/W use, improve NASA's return on E/W investments, and better align investments with larger OSI efforts to improve critical facility reliability and reduce maintenance and operations costs.

This objective is also central to supporting new OMB requirements for data-driven decision-making and data-based performance reviews.

Measures of Success

- Enterprise solution(s) for critical data management, integration, and analytics have been implemented and non-enterprise solutions have been discontinued.

Getting it Done

- ✓ Define E/W requirement for data analytics.
- ✓ Integrate E/W requirements in current OSI data initiatives.
- ✓ Use agencywide integrated data sets for E/W management.
- ✓ Include data integration, management, and analytics processes in EMD data management plans.

Stakeholders

Responsible: EMD Energy Manager

Accountable: EMD Management

Consult: FRED Energy Manager; FRED Master Planner, GIS, O&M, D&C; OSI CIE; Center E/W Managers

Inform: FRED Management

Additional Resources Required: TBD

Implementation Timeframe: FY21-FY23

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓			

INITIATIVE 2.2.2 AGENCY METERING PLAN

Develop and implement E/W metering plan that prioritizes metering investments according to impact on E/W cost management.

Rationale

NASA has installed energy meters in most facilities. However, maintaining calibration and managing data quality on these thousands of meters is costly and time-consuming. NASA's water metering is unevenly distributed, and more metering is needed to better control water consumption and identify significant leaks. In addition, the Energy Act of 2020 includes new water metering requirements.

An agencywide plan will prioritize E/W metering investments according to impact to cost and consumption and ensure the highest return on investment (ROI) on costly metering investments. The plan will also evaluate standardizing both meter operational requirements and the system to which those meters report.

DOE requires regular updates to agency metering plans; an update call from DOE is expected in FY22.

Measures of Success

- All mission critical and/or high-cost E/W uses are appropriately metered.

Stakeholders

Responsible: EMD/FRED Energy Managers

Accountable: OSI AA

Consult: OSI CIE; Center E/W Managers

Inform: EMD/FRED Management

Additional Resources Required: TBD

Implementation Timeframe: FY22

Getting it Done

- ✓ Define E/W metering requirements and prioritize center metering gaps.
- ✓ Update NASA's Agency Metering Plan per DOE guidance.
- ✓ Seek funding to install metering on all mission critical and/or high-cost E/W uses.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓				

INITIATIVE 2.3.1 ENERGY PERFORMANCE CONTRACT MANAGEMENT

Develop and implement centralized agency project proposal review, approval, implementation, and post-construction management protocols and expertise to better manage future utility budget obligations (and associated risks) of financed E/W projects.

Rationale

NASA has over $100M in financed E/W project contracts. Currently these projects are developed, reviewed, procured and managed at the center level; in some cases, contracts have been awarded with no HQ review or approval (this review is required by NPR 8820.2G, Facilities Project Requirements). As a result, NASA is incurring cumulative long-term future obligations against utility budgets with little to no HQ consultation, putting NASA at financial risk and impeding an effective investment strategy that identifies the optimal funding mechanism for projects from an agency perspective.

FRED will plan and implement a more proactive, formal, and centralized process for implementing performance contracts based on best practices and procedures already developed by DOE's Federal Energy Management Program as well as on lessons learned within the agency. OP will evaluate consolidating procurement of performance contracts to ensure consistency and develop agency performance contracting expertise. FRED/OP will also engage OGC to establish agencywide legal expertise for performance contracts.

Measures of Success

- Centers always follow the required HQ review and approval process for performance contracts.
- If applicable, OP and OGC experts provide centralized performance contracting support.

Getting it Done

- ✓ Establish OSI performance contract project proposal evaluation criteria and approval processes.
- ✓ Establish agency performance contracting review and oversight team.
- ✓ If recommended, establish agencywide performance contract procurement and/or legal team.

Stakeholders

Responsible: FRED Energy Manager / FRED Utility Manager

Accountable: FRED Management

Consult: EMD Energy Manager, OSI CIE, OP, OGC, OCFO, Center (EMs, OP)

Inform: OP/OCFO/OGC Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY21-FY23

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓		

INITIATIVE 2.3.2 ECM PRIORITIZATION AND IMPLEMENTATION PROCESSES

Implement an agencywide ECM project prioritization and implementation process that is flexible, responding to changing mission priorities and fluctuating fund availability, and maximizes the agency's ROI.

Rationale

Currently, Construction of Facilities (CoF) and Enhanced Use Lease (EUL) funded ECM prioritization is ad hoc within FRED, and no agencywide guidance directs center prioritization. FRED has an incomplete agencywide view of potential projects, and project proposal quality varies widely. In addition, variations in funding availability impact project implementation on an almost yearly basis, forcing rapid changes to project prioritization.

In order to maximize the agency's ROI for E/W investments while remaining aligned with changing mission needs, NASA requires an established procedure and criteria for prioritizing investment opportunities, including contingency plans to adapt to changes in funding, and for determining the optimal funding mechanism for each project (e.g. CoF, EUL, 3rd party financing, etc.).

Measures of Success

- E/W investments are consistently evaluated and prioritized according to an established procedure; funding mechanisms are employed in a consistent manner that maximizes agency ROI and minimizes financial risk.

Stakeholders

Responsible: FRED Energy Manager

Accountable: FRED Management

Consult: EMD Energy Manager, OSI CIE, Center E/W Managers

Inform: EMD Management, OSI AA

Additional Resources Required: None

Implementation Timeframe: FY21-FY22

Getting it Done

- ✓ Standardize procedure for identifying and prioritizing ECMs for implementation.
- ✓ Implement standardized procedure.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓		

INITIATIVE 2.3.3 AGENCY ENERGY MODELING STRATEGY

In order to maximize E/W investment ROI, identify preferred energy modeling software for ECM identification and measurement and verification, develop or procure expertise in using these models, and ensure consistent applications of the models across projects.

Rationale

Energy modeling can be an effective and relatively low-cost tool for identifying ECMs and for performing M&V on completed projects. However, using models effectively requires expertise, and building consistently effective energy models across a portfolio requires complying with standard modeling practices. In order to leverage energy models economically for identifying ECMs and to use these models to determine ROIs for agency ECMs, NASA must develop standards in energy modeling and apply them consistently (including modeling done by contractors in design and construction projects) as well as guidance on when energy modeling should be performed.

Measures of Success

- NASA effectively employs a minimum of different effective modeling applications to ensure E/W project/initiative effectiveness and optimize E/W investment ROI.

Stakeholders

Responsible: FRED (role TBD)

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, FRED O&M and D&C, OSI CIE, Center E/W Managers

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY21-FY23

Getting it Done

- ✓ Define agency needs for modeling software.
- ✓ Specify energy modeling software applications to be used in agency energy/water management.
- ✓ Implement standardized modeling requirements across the agency.
- ✓ Determine if agencywide contract support for energy modeling is needed to ensure consistency and quality and procure contract support if justified.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓		

INITIATIVE 2.3.4 AGENCY ECM DATABASE

Standardize methodologies to identify ECMs to improve project data consistency and quality, identify SEU projects/initiatives, and provide a single database to facilitate efficient project prioritization for implementation.

Rationale

Facility audits are the primary means for identifying life cycle cost effective ECMs. As of FY21 every center procures audits individually, sometimes with multiple contract actions, and center approaches to project identification are fragmented and uneven. Not all projects are adequately captured/documented, and project proposal quality is uneven. Historically, non-capital investment initiatives involving process improvements and O&M have not been documented, and many SEUs have not been audited.

This initiative will standardize audit processes (and contracts if possible); implement comprehensive E/W facility evaluations ("audits") in SEU facilities that have not previously been audited; and collate identified projects into agencywide database to facilitate both agency- and center-level prioritization of projects.

Once potential ECMs are identified, projects will be collated into a single database and ensuring the ECM data is of acceptable quality. This allows effective identification and prioritization of projects both at the center and agencywide levels and facilitates consistent characterization of ECM ROI as well as maximizing ROI of investments.

Measures of Success

- E/W audit costs have been minimized due to efficient use of regional/agencywide contracts.
- ECMs are documented in a consistent manner with consistent information and data quality.
- All ECMs are entered into a single database that allows agencywide prioritization of projects/initiatives.

Stakeholders

Responsible: FRED Energy Manager

Accountable: FRED Management

Consult: EMD Energy Manager, OSI CIE, OP, Center E/W Managers

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY22-FY25

Getting it Done

- ✓ Standardize facility energy/water audit requirements.
- ✓ Develop agencywide ECM database.
- ✓ Assess opportunities for reducing audit costs and/or number of contract actions.
- ✓ Implement prioritized cost/contract recommendations.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓		

INITIATIVE 2.3.5 ECM MEASUREMENT AND VERIFICATION

In order to maximize agency E/W investment ROI, develop and implement guidance on when and how to perform M&V on ECMs.

Rationale

M&V is critical for evaluating the performance of implemented ECMs. However, M&V can be complicated and expensive, and in order to maximize M&V effectiveness, NASA needs to develop and implement guidance on how and when to perform M&V.

NASA has little/no visibility on the actual life cycle cost effectiveness of energy projects, making it impossible to optimize future investment strategy. NASA requires energy modeling for new construction facilities, but design v. actual energy performance M&V is rarely performed. Agency-funded energy projects rarely include funds for M&V. All Energy Savings Performance Contracts (ESPCs) require annual M&V, but center expertise in evaluating the contractor-submitted M&V reports varies widely, and HQ does not review M&V reports. ECMs involving process improvements or O&M optimization rarely include M&V. In addition, Federal statute requires Agencies to measure and verify savings of implemented ECMs. NASA is largely out of compliance with this requirement.

In order to effectively leverage M&V to inform the agency's investment strategy and to meet Federal M&V requirements, FRED will develop and implement guidance that establishes which projects should include M&V, what level/type of M&V should by performed, and who should be performing the M&V (e.g., centralized contract support for M&V, regionalized support, contract v. civil service).

Measures of Success

- NASA consistently and efficiently performs M&V to determine the cost effectiveness of ECMs.
- Key agency/center E/W investments/initiatives have been measured and verified, and results inform future investment decisions.

Getting it Done

- ✓ Develop and implement guidance that establishes which projects should include M&V, what level/type of M&V should by performed, and who should be performing the M&V.
- ✓ Assess and recommend staffing strategy to comply with M&V guidance.

Stakeholders

Responsible: FRED Energy Manager

Accountable: FRED Management

Consult: EMD Energy Manager, OSI CIE, Center E/W Managers

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY23-FY25

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓		

INITIATIVE 2.4.1 ENERGY/WATER IN O&M CONTRACTS

Partner with Procurement to develop standard contract language for procuring EMCS/O&M services specific to supporting E/W management.

Rationale

O&M is a fundamental – perhaps the most fundamental – function impacting E/W use at NASA, and O&M contracts have a significant impact on the agency's total E/W use. However, O&M contracts across the agency have widely varying contract language addressing E/W management goals and best practices. In addition, multiple contracts may be awarded at the same site, with some addressing institutional O&M and others mission facility O&M.

Standardizing contract language will ensure best management practices are required at all centers and will facilitate training, cross-center sharing of expertise, and oversight of implementation across the agency. Language should include metrics and/or incentives if appropriate.

Measures of Success

- All NASA O&M contracts have incorporated consistent language that ensures O&M support for and execution of E/W best management practices.

Stakeholders

Responsible: FRED O&M Manager / OP O&M Contract Lead

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, OSI CIE, Centers (E/W Managers, O&M, OP)

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY22-FY32

Getting it Done

- ✓ Establish standardized language for procuring EMCS/O&M services for E/W management.
- ✓ Incorporate recommended standardized contract language in center O&M service contracts.
- ✓ Train O&M civil servants and contract personnel in new contract requirements.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓			✓

INITIATIVE 2.4.2 SEU PROCESS IMPROVEMENTS

Optimize SEU operations processes where possible to reduce E/W cost/consumption.

Rationale

As an agency, NASA has not focused on process improvements for SEUs such as wind tunnels, compressor stations, labs/clean rooms, as these facilities are especially mission-driven, with a focus on reliability and availability. However, evaluating these processes for E/W use reduction opportunities will likely both reduce utility costs as well as reduce wear/tear on equipment. Implementing any identified efficiencies will require close coordination with both operators and mission programs to ensure no impact on mission.

Because this is a new area of focus for E/W management, this effort begins with pilot(s) in areas with highest ROI and support from mission. If significant savings opportunities are proven in pilots, then initiatives can be implemented agencywide.

Measures of Success

- SEU process improvement pilots have been implemented and E/W use reductions measured and verified.

Getting it Done

- ✓ Develop agencywide assessment of top energy-using facility types and facilities.
- ✓ Identify SEU projects/initiatives that have significant opportunity for energy optimization.
- ✓ Prioritize initiatives by ROI and feasibility and identify funding /contract mechanisms to execute.
- ✓ Implement pilot initiative(s) to quantify ROI and establish standardized best practices.
- ✓ Implement high ROI best practices across the agency.

Stakeholders

Responsible: FRED O&M

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, OSI CIE, Centers (E/W Managers, O&M), Mission Directorates, Technical Capability Portfolio Managers

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY21-FY26

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓		✓		✓

INITIATIVE 2.4.3 EMCS/BAS OPERATIONAL GUIDANCE

Standardize EMCS/BAS E/W management best practices consistently across agency to optimize E/W efficiency.

Rationale

While all centers have operational EMCS/BAS, gaps exist both in physical infrastructure and in optimizing operations. centers are working individually to address system deficiencies, but there is no agencywide plan to address EMCS/BAS deficiencies. In addition, these systems are not always optimized for E/W consumption. There is no agencywide guidance/expertise/training in EMCS/BAS operations, nor consistency in contractual terms and enforcement.

Since these systems have a significant impact on NASA's E/W use, optimizing these systems both physically and operationally will significantly reduce the agency's E/W consumption. There are also concomitant benefits to maintenance, as running equipment efficiently generally reduces run time, operates equipment at optimal loading, and/or eliminates excessive cycling of equipment.

Measures of Success

- All NASA EMCS/BAS are operated to ensure E/W efficiency wherever this is not detrimental to mission operations, health/life/safety, or other higher priorities.

Stakeholders

Responsible: FRED O&M Manager

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, OSI CIE, Centers (E/W Managers, O&M)

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY24-FY28

Getting it Done

- ✓ Assess EMCS/BAS conditions across the agency and address infrastructure deficiencies to bring all systems up to full operability.
- ✓ Include E/W management best practices in agency EMCS/BAS operational standards.
- ✓ Ensure EMCS/BASs are adequately staffed and trained.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓	✓	✓

INITIATIVE 2.4.4 EMCS/BAS ANALYTICS

Implement EMCS/BAS analytics to further reduce E/W cost/consumption.

Rationale

Once NASA has established and begun implementing EMCS/BAS systems optimization, additional optimization may be possible through advanced analytics such as Fault Detection and Diagnostics (FDD). This technology goes beyond traditional EMCS/BAS fault detection, using machine learning and diagnostics to quickly identify root causes and recommend solutions. In traditional EMCS/BAS operations, the same fault detection, root cause analysis, and recommended solution may occur, but the process is not automated and requires more human work. For EMCS/BAS systems with adequate sensors, FDD software can complete the fault detection/analysis/solution process much faster, allowing operators to respond more quickly and accurately to failures.

FDD also supports continuous commissioning capability to buildings, which allows NASA to maintain the E/W savings realized through initial construction of high-performance sustainable buildings. This initiative is also aligned with NASA's larger commitment to implementing condition-based monitoring (CBM) systems across the agency.

Since this is a new technology for NASA, this initiative pilots 1-2 potential software solutions at a center(s) to assess actual ROI for this initiative as well as identify any barriers to implementation.

Measures of Success

- All NASA EMCS/BAS are operated to ensure E/W efficiency wherever this is not detrimental to mission operations, health/life/safety, or other higher priorities.

Getting it Done

- ✓ Partner with center EMCS/BAS experts to assess opportunities for advanced EMCS/BAS analytics to further reduce E/W consumption.
- ✓ Evaluate available technical/ software solutions and recommend option(s) for piloting.
- ✓ Pilot software solution(s) and make recommendation on agencywide rollout of program.

Stakeholders

Responsible: FRED O&M Manager

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, OSI CIE, Centers (E/W Managers, O&M)

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY25-FY30

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓	✓	✓

INITIATIVE 2.4.5 CONTINUOUS COMMISSIONING

Expand continuous commissioning to reduce E/W cost/consumption.

Rationale

While NASA has integrated E/W efficient design into new construction/major renovation projects, the agency does not have a well-established continuous commissioning (CCx) program. As a result, the initial E/W savings realized in these projects can quickly diminish as buildings systems undergo operational drift. Continuous commissioning is intended to prevent operational drift and maintain nominal operations in all systems, thereby minimizing equipment wear and tear and reducing maintenance/energy/water costs.

Developing and implementing continuous commissioning guidance is complementary to standardizing EMCS/BAS operations and analytics and should be the immediate follow-on to those objectives. In addition, continuous commissioning complements FRED's current Existing Building Commissioning (EBCx) program and will allow operators to maintain the operational improvements resulting from that program.

An additional benefit is that buildings that are under CCx are not required to be re-audited every four years to meet Energy Independence and Security Act of 2007 Section 432 requirements. This will avoid audit costs for those buildings.

Measures of Success

- New construction, retro-commissioned, and other appropriate buildings employ CCx to ensure E/W and operational efficiencies are maintained.
- Buildings under CCx program are not audited separately for EISA 2007 Section 432 requirements.

Getting it Done

- ✓ Develop agencywide continuous commissioning guidance.
- ✓ Train managers and operators in continuous commissioning.
- ✓ Implement continuous commissioning in all new construction/major renovations projects and after all EBCx projects.

Stakeholders

Responsible: FRED O&M Manager

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, OSI CIE, Centers (E/W Managers, O&M)

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY25-FY27

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓	✓	✓

INITIATIVE 2.4.6 O&M FUNCTIONAL REVIEWS

Based on NPR 8831.2, Facilities Maintenance and Operations Management, develop and implement an agencywide functional review program to provide oversight of and support to center O&M programs.

Rationale

NASA has successfully implemented agencywide functional review programs in several areas, including environmental and energy management, safety, and protective services. These programs have proven essential in improving program management and performance at centers, leading to both enhanced cost avoidance in areas such as E/W use reductions as well as in areas such as fines for environmental compliance violations.

However, the agency does not have established review and oversight of center O&M programs to ensure compliance with NPR 8831.2, nor does NASA have agencywide guidance on O&M best practices. Since O&M implementation has such a significant impact on utility budgets as well as O&M budgets, establishing agencywide guidance and implementing regular reviews of center O&M programs based on this guidance can have significant ROI and long-term positive impact on O&M budget requirements. agencywide functional reviews also facilitate identifying systemic gaps/opportunities across all centers.

Measures of Success

- O&M functional reviews provide support and guidance for and recognition of centers successfully meeting requirements of NPR 8831.2.

Stakeholders

Responsible: FRED O&M Manager

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, OSI CIE, Centers (O&M)

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY25-FY28

Getting it Done

- ✓ Develop O&M functional review protocol.
- ✓ Establish O&M functional review schedule.
- ✓ Implement O&M functional reviews so that each center is reviewed on regular cycle.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓	✓	✓

GOAL 3: SUSTAINABILITY

Promote sustainable practices and foster a proactive, sustainability-focused culture agencywide to minimize the agency's impact on the environment.

OBJECTIVE 3.1 CLEAN ENERGY AND SUSTAINABLE FACILITIES

Ensure that NASA continues progress toward clean energy (CE) and sustainable facilities targets and goals in its annual Sustainability Plan.

Initiative 3.1.1 Agency CE/REC Purchase

Institutionalize process to meet agency CE goals with centralized purchases of clean energy and/or renewable energy credits.

Initiative 3.1.2 Clean Energy Projects

To maximize NASA use of CE, update the agency's CE opportunities across all sites and develop prioritized list for implementation.

Initiative 3.1.3 Sustainable Facilities

Ensure new construction/major rehab projects and selected existing buildings meet E/W efficiency requirements in NPR 8820.2G, Facility Project Requirements, and in the Guiding Principles for Sustainable Federal Buildings ("Guiding Principles").

OBJECTIVE 3.2 SUSTAINABLE CULTURE

Foster a proactive, E/W conservation-focused culture agencywide.

Initiative 3.2.1 Energy/Water Outreach and Awareness Campaign

Support center EWM programs and increase agency personnel engagement to reduce E/W use and cost with annual outreach and awareness campaign.

INITIATIVE 3.1.1 AGENCY CE/REC PURCHASE

Institutionalize process to meet agency CE goals with centralized purchases of renewable electricity and/or renewable energy credits (RECs).

Rationale

Energy Policy Act (EPAct) of 2005 requires that 7.5% of agency electrical energy use be from renewable sources, a requirement that NASA has historically pushed down to the centers. Since most centers' self-generated renewable capacity do not meet this requirement, centers purchased RECs to meet the goal, with each center responsible for its own procurement. In FY20, FRED revised this policy and began purchasing RECs with one centralized procurement for the entire agency. Centers are no longer required to meet CE goals individually.

FRED will continue this strategy, which eliminates center-level labor for both energy managers and for OCFO and OP staff at all but one center (HQ does not have a procurement office and relies on centers for procurement actions). In addition, FRED will regularly evaluate available procurement mechanisms to ensure the agency is minimizing the cost for meeting the CE requirement while maximizing NASA's CE consumption.

Measures of Success

- Only one procurement action is used to buy renewable electricity/RECs required to meet Federal CE requirements.

Stakeholders

Responsible: FRED Utility Manager

Accountable: OSI AA

Consult: EMD/FRED Energy Managers, OP, Centers

Inform: EMD/FRED Management

Additional Resources Required: None

Implementation Timeframe: FY21-FY22

Getting it Done

- ✓ Document annual process for renewable electricity/RECs procurement, with established roles and responsibilities.
- ✓ Implement process annually.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓	✓		✓

INITIATIVE 3.1.2 CLEAN ENERGY PROJECTS

To maximize NASA use of CE, update the agency's CE opportunities across all sites and develop prioritized list for implementation.

Rationale

In FY16, NASA partnered with DOE's National Renewable Energy Laboratory (NREL) to identify potential CE projects across the agency and prioritize the opportunities as part of an agencywide Strategic Energy Investment Plan. Since 2016, some CE projects have been implemented, and centers have continued to independently identify projects as well. To ensure NASA is installing all available life cycle cost (LCC)effective CE projects to reduce greenhouse gas emissions and improve facility resilience and security, the agencywide assessment should be updated on a regular basis or as dictated by market changes, resilience needs, or other drivers.

Measures of Success

- NASA invests in CE projects where LCC effective and/or where onsite CE generation enhances resilience.

Stakeholders

Responsible: FRED Utility Manager

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, OSI CIE, Centers

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY24

Getting it Done

- ✓ Contract with NREL or appropriate entity to re-evaluate CE opportunities across the agency based on current/projected markets and agency resilience priorities.
- ✓ Develop implementation plan based on evaluation.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓		✓		✓

INITIATIVE 3.1.3 SUSTAINABLE FACILITIES

Ensure new construction/major rehab projects and selected existing buildings meet E/W efficiency requirements in NPR 8820.2G and in the Guiding Principles for Sustainable Federal Buildings ("Guiding Principles").

Rationale

FRED oversees center CoF design and construction projects to ensure new construction/major rehab design processes include E/W efficiency measures as required by Federal statutes and regulations as well as by NPR 8820.2, Facility Projects Requirements. In addition, FRED requires these projects to be Leadership in Energy and Environmental Design (LEED) Silver certified and uses this certification to meet the Guiding Principles. In order to minimize E/W use in these buildings and ensure design efficiencies continue beyond the initial occupancy period, FRED should periodically re-evaluate that these buildings continue to meet the Guiding Principles.

For existing buildings, the Guiding Principles are a valuable tool for assessing if buildings are operating as efficiently as possible. NASA does not currently apply the Guiding Principles to existing buildings to any significant extent. In order to minimize E/W use in eligible existing buildings, as well as increase the agency's portfolio of high-performance sustainable buildings, NASA should implement an Existing Building Guiding Principles program that identifies buildings that would benefit from Guiding Principles compliance and implements the Principles in those buildings.

Measures of Success

- All appropriate NASA facilities meeting the Guiding Principles for Sustainable Federal Buildings.

Getting it Done

- ✓ Develop NASA-specific guidance on implementing Guiding Principles in new construction/major rehabilitations and in existing buildings.
- ✓ Develop NASA-specific criteria for determining which existing buildings should meet the Guiding Principles.
- ✓ Determine the most cost-effective method of implementing the Guiding Principles in existing building.
- ✓ Begin implementation of Guiding Principles in appropriate existing buildings.

Stakeholders

Responsible: FRED Sustainable Facilities Manager

Accountable: FRED Management

Consult: EMD/FRED Energy Managers, OSI CIE, Centers

Inform: EMD Management, OSI AA

Additional Resources Required: TBD

Implementation Timeframe: FY25-FY27

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
✓	✓			✓

INITIATIVE 3.2.1 ENERGY/WATER OUTREACH AND AWARENESS CAMPAIGN

Support center EWM programs and increase agency personnel engagement to reduce E/W use and cost with annual outreach and awareness campaign.

Rationale

As NASA moves from managing infrastructure and utilities autonomously at the center level to a more centralized and agencywide perspective, it is important that center personnel understand how E/W initiatives support NASA's mission, how their site's E/W use impacts NASA both from a budgetary and sustainability perspective, and how they personally can reduce E/W use and cost at their center.

In order to promote this understanding, in FY20 EMD began developing a multi-year outreach and awareness campaign to provide center E/W managers with tools to raise awareness of these issues at their sites. This low-cost measure will raise awareness of the magnitude of the agency's utility spend and help build support and buy-in for ECMs, especially ECMs focused on process improvements, which require the support and action of many different center personnel. The campaign will also raise awareness in NASA's general population and nudge them to more E/W-efficient behaviors.

This campaign also relieves some burden from centers in developing their annual outreach and awareness programs, which are required by NASA policy and 50001 Ready.

Measures of Success

- Center E/W managers use HQ-provided campaign materials in center campaigns, reducing center effort for this requirement.
- At centers, individuals and/or groups are taking voluntary actions to reduce E/W use.
- Improved collaboration between HQ/center energy management teams and key stakeholders.

Stakeholders

Responsible: EMD Energy Manager

Accountable: EMD Management

Consult: FRED Energy Manager, OSI CIE, EMD Sustainability Team, Centers

Inform: FRED Management, OSI AA

Additional Resources

Required: None

Implementation

Timeframe: FY20-FY24

Getting it Done

- ✓ Develop and execute the FY21 campaign with stakeholder input.
- ✓ Measure impact of the campaign and apply lessons learned to subsequent annual campaigns.
- ✓ After year five of implementation, assess impact of the campaign and make recommendation on continuing campaign.

Anticipated Benefits

Improved Efficiency & Effectiveness	Standardized Services & Solutions	Cost Savings	Workforce Development	Promotes Sustainable Practices
	✓	✓		✓

STRATEGIC PLAN IMPLEMENTATION SCHEDULE

This implementation schedule **assumes a fully resourced OSI EWM program, which is not the program's status as of FY21.** The schedule will be revised in FY22 to more accurately reflect actual staff and budget resource levels.

E/W Plan Initiative	Begin Implementation					
	FY20	FY21	FY22	FY23	FY24	FY25+
1.1.1 DOE 50001 Ready Implementation						
1.1.2 Energy/Water and Master Planning						
2.3.3 Agency Energy Modeling Strategy						
3.1.1 Agency RECs Purchases						
3.1.2 Agency Outreach and Awareness Campaign						
1.1.2 HQ Energy Efficiency Team						
1.2.1 Energy/Water Workforce Strategy						
2.1.1 Utility Procurement Acquisition Strategy						
2.1.2 Utility Rebate Retention						
2.2.1 Data Integration, Management and Analytics Plan						
2.3.1 Energy Performance Contract Management						
1.1.2 Center Energy/Water Goals						
1.2.2 Energy/Water Management Training						
2.2.2 Agency Metering Plan						
2.3.2 ECM Prioritization and Implementation Processes						
2.3.4 Agency ECM Database						
2.4.1 Energy/Water in O&M Contracts						
2.3.5 ECM Measurement and Verification						
2.4.2 SEU Process Improvements						
2.4.3 EMCS/BAS Operational Guidance						
2.1.3 Utility Cost Avoidance Reinvestment						
3.1.2 Renewable Energy Projects						
2.4.4 EMCS/BAS Analytics						
2.4.5 Continuous Commissioning						
2.4.6 O&M Functional Reviews						
3.1.3 Sustainable Facilities						

ENERGY AND WATER MANAGEMENT PLAN

This Energy and Water Management Plan (MP) documents how NASA will meet the requirements of NASA Procedural Requirement (NPR) 8570.1B, NASA Energy and Water Management Program, through the implementation of the Department of Energy (DOE) 50001 Ready program, which is aligned with ISO 50001, Energy Management System (EnMS), to establish a systematic approach in achieving continual improvement in energy/water (E/W) performance.

NASA ENERGY AND WATER MANAGEMENT POLICY

The foundation of NASA's energy and water management (EWM) program is NPR 8570.1B, NASA Energy and Water Management Program, which establishes the requirements, roles, and responsibilities for agency and center EWM programs. The NPR is signed by NASA's administrator and documents the agency's commitment to

- Reduce E/W risk to mission by increasing the life-cycle cost-effective use of E/W efficiency methods, clean energy sources, and resilient E/W systems in compliance with Federal law, Executive Orders (EOs), and NASA policy.
- Enhance E/W security and resource availability for current and future mission requirements
- Promote mitigation of E/W-related climate change risks and impacts and use of lower impact energy sources.
- Support comprehensive center EWM programs.

In the FY20 update, the NPR was revised to be fully aligned with 50001 Ready requirements. The NPR is updated every five years; the next update will be in FY25. Minor interim administrative updates will be done as legal/statutory/other requirements change.

NASA ENERGY AND WATER PERFORMANCE PLAN

NPR 85701.B requires the development and dissemination of an Agency Energy and Water Performance Plan (EWPP) that documents NASA's approach for meeting the program requirements documented in the NPR and the strategy for meeting EWM goals and objectives.

Per this requirement, this EWPP has two components: this MP that provides the NASA's management framework to ensure continual improvement, meet agency program requirements, and comply with Federal requirements; and the agency-level Strategic Plan that outlines how NASA will meet its EWM goals and objectives.

The EWPP applies to all NASA centers and Component Facilities ("centers") and associated E/W consumption, with the following exceptions:

- Buildings, facilities, and businesses located on NASA centers that are treated as reimbursable tenants
- Fuels that are not directly used by facilities (e.g. propane for forklifts, aviation fuel, etc.).
- Non-potable water

The EWPP is available on the NASA EWMP SharePoint site.

HOW TO USE THIS MANAGEMENT PLAN

This MP document addresses both the Headquarters (HQ) agency-level Energy Management System (EnMS) and the center EnMS. For ease of reference, HQ and center EnMS requirements are documented separately.

For brevity, the MP will refer to other documentation where available, with links provided, rather than repeat information documented elsewhere. This documentation resides on the NASA EWMP SharePoint site and is found primarily in the NPR 8570.1B Resource Guide and on the HQ 50001 Documentation site.

The Office of Strategic Infrastructure (OSI) E/W Team will review and update the MP annually. Every 5 years, concurrent with the NPR 8570.1 update cycle, the OSI Assistant Administrator (AA) will review and approve the MP. The OSI AA will review/approval interim administrative updates if warranted.

HQ ENERGY MANAGEMENT SYSTEM

NASA's EnMS follows a Plan-Do-Check-Act (PDCA) process to ensure continual improvement. At the HQ level, this process is independently evaluated annually as part of the Environmental Management Division's (EMD) annual Environmental Management System (EMS) review. At the center level, the EnMS is independently evaluated every three years as part of the Environmental and Energy/Water Functional Review (EEFR).

This MP will follow the PDCA format for ease of reference.

FOUNDATIONAL ELEMENTS

Underpinning the PDCA process of the HQ EnMS are several foundational elements that provide programmatic structure and context.

DATA MANAGEMENT

Good data management is a fundamental requirement of an effective EnMS. The OSI E/W Team documents its data management practices in data management plans that are updated annually. These data management plans include the following:

- Annual Reporting
    - Covered Facilities
    - E/W Project Tracking
    - Energy Star Portfolio Manager
    - Metering
    - Renewable Energy
    - Center Square Footage
    - Training
- Semi-annual Reporting
    - Comprehensive Evaluations
    - Renewable Energy
- Quarterly Reporting
    - E/W Consumption
    - E/W Cost
- Environmental and Energy/Water Functional Reviews (Energy portion only)
    - EEFR Schedule
    - EEFR Review Process
    - EEFR Corrective Action Process

COMMUNICATIONS

Communications about the NASA EnMS are managed through the EnMS Communications Plan, which is developed and implemented by EMD.

OSI ENERGY/WATER TEAM

The OSI E/W Team comprises the EMD Energy Manager, FRED Energy Manager, and OSI Critical Infrastructure Engineer, as well as any contract personnel supporting OSI E/W work.

HQ ENERGY/WATER EFFICIENCY TEAM

The HQ Energy/Water Efficiency Team (EET)[10] will be established in FY21 and will support development of agency-level E/W policy, planning, and leadership strategy; implement NASA E/W policies appropriate to their functional areas; recommend E/W efficiency initiatives; and develop consensus positions on E/W efficiency priorities, practices, and issues.

AGENCY ENERGY/WATER EFFICIENCY PANEL

The agency Energy/Water Efficiency Panel (EEP) is defined in NPR 8570.1B and comprises center Energy Managers as well as OSI FRED/EMD Energy Managers and the OSI Critical Infrastructure Engineer.

The EEP

- Supports development of agency EW efficiency and conservation policy, EWPP, and leadership strategy.
- Recommends EW efficiency and conservation initiatives.
- Supports center Directors in implementing NASA EW efficiency and conservation policies through shared innovations and use of ESPCs, Utility Energy Service Contracts (UESCs), Enhanced Use Lease (EULs), and other alternative financing mechanisms.
- Develops consensus positions on EW efficiency and conservation priorities, practices, and issues across agency and Mission Directorate activities.
- Sponsors or conducts studies and assessments of EW efficiency and conservation issues affecting NASA programs and activities.

Center and OSI E/W support personnel are included in EEP meetings and activities as well.

OTHER FOUNDATIONAL ELEMENTS

The following foundational elements can be found on the NPR 8570.1B Resource Guide:

- NPR 8570.1B, NASA Energy and Water Management Program
- Applicable Federal laws and other requirements
- Applicable NASA requirements
- FRED E/W projects prioritization and funding process

[10] Prospective HQ EET members were consulted in development of the FY21 EWPP.

HQ ENMS: PLAN

This section documents the HQ process for EWM planning.

STRATEGIC PLANNING HISTORY

Since FY16, NASA has engaged in agencywide strategic planning for E/W management, with a specific focus on improving facility and operations affordability in support of NASA Strategic Plan Objective 4.6, Sustain Infrastructure Capabilities and Operations. The resulting Strategic Energy Investment Plan outlined the highest return on investment (ROI) projects across the agency, but only in facilities subject to Federal goals ("goal subject" or "GS" facilities).

In FY19, this planning was expanded to address E/W use in all NASA facilities, particularly significant energy/water uses (SEUs), and to align with the strategic thrusts of the OSI Mission Support Future Architecture Program (MAP) and the OSI Environmental Management Enterprise (EME) goals[11]:

The OSI E/W Team held a multi-day strategic planning retreat in FY19 that comprehensively assessed strengths, weaknesses, opportunities, and risks to energy and water resources required by NASA to complete its mission. Following this in-depth planning, the team consulted with HQ stakeholders and NASA's energy and water community of practice, the EEP, to refine goals, objectives, initiatives and performance measures for the plan.

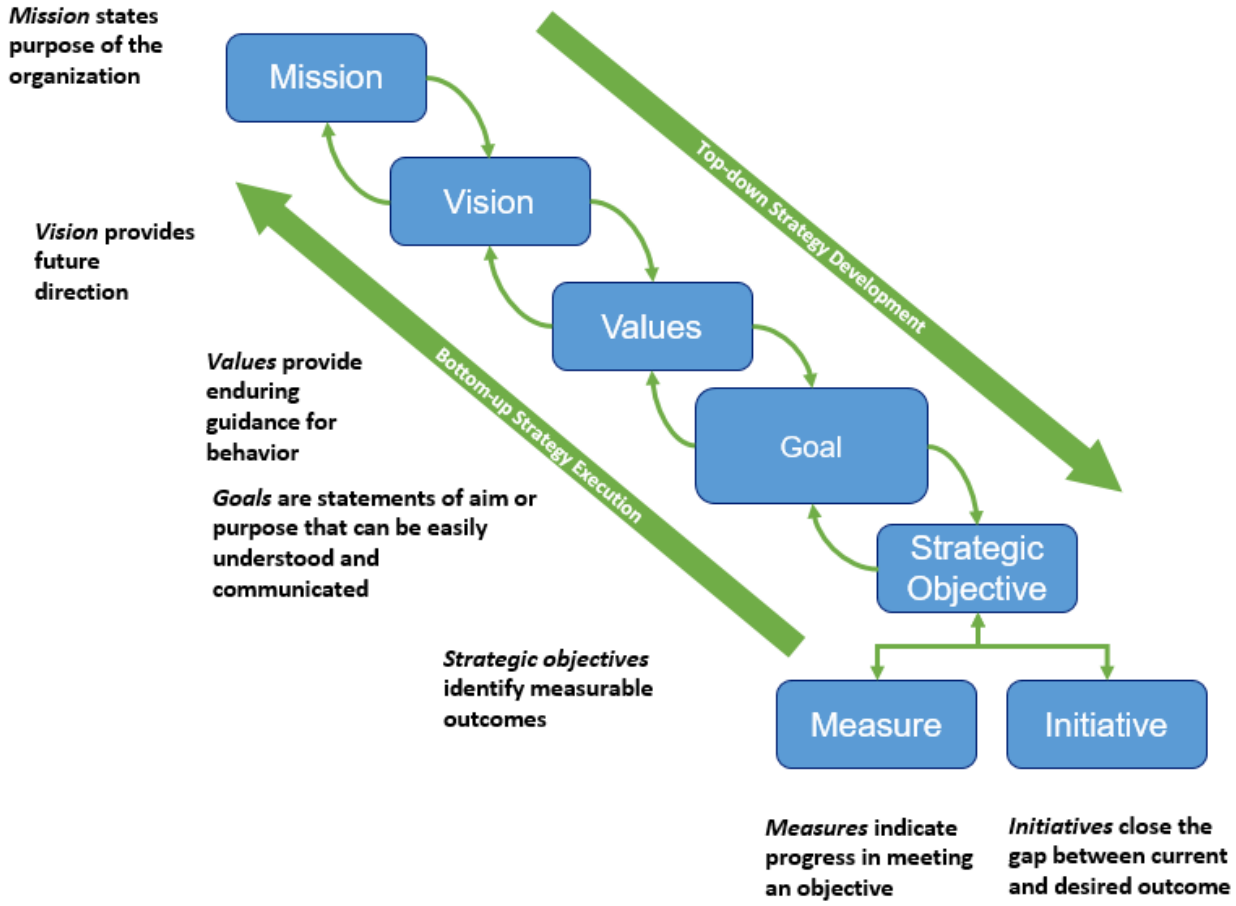
In developing this plan, the OSI E/W Team also worked with the EEP to develop a common set of core values to guide us as we do our work in service of the agency's mission.

The resulting FY21 NASA Energy and Water Strategic Plan is the first agencywide plan to comprehensively address E/W management across the agency.

[11] As of May 2021, the EME goals have not been finalized. The EWPP will be updated once the goals are finalized.

AGENCY STRATEGIC PLANNING PROCESS

The SP is comprised of long-term goals, which are achieved through multiple objectives. These objectives have one or more initiatives – tactical, specific plans that provide stepwise progress toward the objectives. The following outlines the process for review and update of the SP.



Annually the OSI E/W Team, with support and concurrence from the HQ Energy/Water Efficiency Team (EET) and the EEP, will

- Review SP to ensure goals and objectives are still in sync with the NASA Strategic Plan, OSI priorities, and EMD/FRED goals and objectives.
- Review current and near-term initiatives to assess progress and update initiatives, including assessment of staff and budget resource constraints.
- Remove initiatives that are complete.
- Add new initiatives if warranted after analyzing changes in strengths, weaknesses, opportunities, and risks to mission.
- Present revised SP to EMD/FRED management for review and approval.
- With EMD/FRED management approval, present to OSI AA for review and approval.

Each current and near-term initiative is required to have a Plan of Action and Milestones (POAM). These POAMs are developed by the person(s) responsible for the initiative in consultation with other stakeholders. These POAMs are not included in the EWPP but are maintained here on the EnMS SharePoint site.

The HQ SP planning process is guided by the 50001 Ready planning requirements documented in Tasks 7 – 13 on the HQ 50001 SharePoint site.

Note on SEUs and the agency SP: HQ's role in addressing NASA's SEUs is to identify the types of facilities that, as a group, comprise a SEU, and to develop replicable projects/initiatives that will have a high impact on the E/W use of these SEU types. Project/initiative implementation and M&V are executed at the center level.

RISK ASSESSMENT

While the SP planning process inherently considers risk, the OSI E/W Team will also assess E/W risk annually through the HQ EMS.

STAKEHOLDERS

The OSI E/W Team identifies stakeholders for each initiative in the SP and defines their roles according to the RACI matrix. Stakeholders are engaged by the Team in planning according to their RACI role.

RACI Model for Stakeholders[12]

RACI Definitions	
Responsible	People or stakeholders who do the work. They must complete the task or objective or make the decision. Several people can be jointly *Responsible*.
Accountable	Person or stakeholder who is the "owner" of the work. He or she must sign off or approve when the task, objective or decision is complete. This person must make sure that responsibilities are assigned in the matrix for all related activities. Success requires that there is only one person *Accountable*, which means that "the buck stops there."
Consult	People or stakeholders who need to give input before the work can be done and signed-off on. These people are "in the loop" and active participants.
Inform	People or stakeholders who need to be kept "in the picture." They need updates on progress or decisions, but they do not need to be formally consulted, nor do they contribute directly to the task or decision.

[12] Definitions from https://www.cio.com/article/2395825/project-management-how-to-design-a-successful-raci-project-plan.html.

HQ ENMS: DO

NPR 8570.1B assigns roles and responsibilities for executing the HQ EnMS. Additional information on roles, responsibilities, and processes are found in the HQ 50001 Ready documentation, the NPR 8570.1 Resource Guide, and in HQ Data Management Plans and EEFR Data Management Plan. Roles, responsibilities, and tasks for execution of initiatives in the SP are found in the initiative POAMs.

HQ ENMS: CHECK

The HQ EnMS has several annual review processes to ensure program requirements are being met:

- Management reviews by the OSI AA occur two times per year.
    - Review of annual Energy Management Report to the DOE (generally in January): this report documents NASA's progress against external energy/water goals/requirements.
    - Review of annual SP update (month TBD): this review covers annual progress on the SP goals, objectives, and initiatives, as well as any proposed changes to the SP. The review also covers any EnMS elements that require OSI AA not covered in the SP.
- Energy and/or water high priority objectives are covered in the annual HQ EMS review with OSI AA (when applicable) (generally in October).
- E/W performance measures are currently included in annual OSI performance reviews for Strategic Goal 4.6.

HQ ENMS: ACT

The OSI E/W Team revises the MP and SP annually based on the results of the above processes and implements any new required action.

CENTER ENERGY MANAGEMENT SYSTEM

CENTER ENERGY AND WATER PERFORMANCE PLAN

NPR 8570.1B requires centers develop an EWPP that meets agency requirements. Per this MP, centers meet this requirement by implementing the DOE 50001 Ready program as documented below.

DOE 50001 READY

DOE's 50001 Ready is a no-cost program designed to allow Agencies to easily align with ISO 50001 requirements. The program's focus on SEUs, M&V of results, and continual improvement support accomplishing the mission using the minimum amount of energy and water required.

In FY20-FY21, centers are assessing their programs using the 50001 Ready process.

- Requirements are documented in the 50001 Ready Navigator, a tool developed by DOE to support 50001 Ready implementation.

- Supporting NASA materials on implementing 50001 Ready, including links to DOE's NASA-specific 50001 Training, are found on the NASA 50001 Ready Teams site. All center E/W personnel are granted access to the Teams site.
- Centers are required to document how their programs meet the requirements and identify gaps in their programs for each of the 25 tasks described in the 50001 Ready Navigator. This center documentation is stored on the EWMP SharePoint Site under EnMS – Energy and Water Management System.

In FY22, per SP Initiative 1.1.4, centers will begin setting center-specific E/W goals. This will replace Federal E/W goal tracking at the center level (the agency will continue to track progress against Federal goals). HQ will review and approve these goals on an annual basis.

In FY23, HQ will begin evaluating centers' EnMS using the 50001 Ready program.

ENVIRONMENTAL AND ENERGY/WATER FUNCTIONAL REVIEW

HQ evaluates each center's EnMS every three years as part of the EEFR. EEFR schedule and processes are documented in the EEFR Data Management Plan. Past EEFR reports are found here. In FY22 HQ will begin evaluating centers' EnMS using the 50001 Ready program.

The Environmental Management Division reports annually to the OSI AA on the results of the previous year's EEFRs, including analysis of center EWM program EEFR results to identify opportunities to improve the agency EWM program.

Additional information for centers for meeting the requirements to NPR 8570.1B and other program requirements is documented in the NPR 8570.1B Resource Guide, including requirements, guidance and resources on

- NPR 8570.1B, NASA Energy and Water Management Program
- Applicable Federal laws and other requirements
- Applicable NASA requirements
- Establishing a center Energy Efficiency Team
- Training
- Planning
- Goals, benchmarking, and audits
- E/W project funding and implementation
- Reporting
- O&M
- Utility management
- Renewable energy
- Outreach and awareness
- E/W sustainable acquisition
- Emergency response and resilience

APPENDIX A: ACRONYMS

AA	Assistant Administrator
AMP	Agency Master Plan
BAS	Building Automation System
BTU	British Thermal Units
BBTU	Billion British Thermal Units
CBM	Condition-Based Monitoring
CCx	Continuous Commissioning
CE	Clean Energy
DOE	Department of Energy
EBCx	Existing Building Commissioning
ECM	Energy and/or Water Conservation Measure
EEFR	Environmental and Energy/Water Functional Review
EEP	Energy/Water Efficiency Panel
EET	Energy/Water Efficiency Team
EISA	Energy Independence and Security Act
EMCS	Energy Management Control System
EMD	Environmental Management Division
EME	Environmental Management Enterprise
EMS	Environmental Management System
EnMS	Energy Management System
EO	Executive Order
EPAct	Energy Policy Act
ESPC	Energy Savings Performance Contract
EUI	Energy Use Intensity
EUL	Enhanced Use Lease
EWM	Energy and Water Management
EWPP	Energy and Water Performance Plan
FBPTA	Federal Buildings Personnel Training Act
FDD	Fault Detection and Diagnostics
FRED	Facilities and Real Estate Division
FY	Fiscal Year
GAL	Gallon
GE	Goal Excluded
GS	Goal Subject
GSF	Gross Square Feet
HQ	Headquarters
LCC	Life Cycle Cost
LEED	Leadership in Energy and Environmental Design
MAP	Mission Support Future Architecture Program
MBTU	Million British Thermal Units
MGAL	Million Gallons

MP	Management Plan
MW	Megawatt
MWH	Megawatt Hour
NASA	National Aeronautics and Space Administration
NPD	NASA Policy Directive
NPR	NASA Procedural Requirement
NREL	National Renewable Energy Laboratory
O&M	Operations and Maintenance
OCFO	Office of the Chief Financial Officer
OGC	Office of the General Council
OP	Office of Procurement
OSI	Office of Strategic Infrastructure
POAM	Plan of Action and Milestones
PDCA	Plan-Do-Check-Act
RACI	Responsible/Accountable/Consult/Inform
RECs	Renewable Energy Certificates
ROI	Return on Investment
SEUs	Significant Energy and Water Uses
SP	Strategic Plan
UESC	Utility Energy Service Contract